

Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The specification has been amended to eliminate some minor obvious errors. No new matter whatsoever has been added.

The claims have been replaced with a set of US-style claims.

Respectfully submitted,  
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**COFFEE MACHINE****DESCRIPTION****CROSS REFERENCE TO RELATED APPLICATIONS**

5        This application is the US national phase of PCT application PCT/EP2003/011643, filed 21 October 2003, published 19 August 2004 as WO 2004/069012, and claiming the priority of Italian patent application MI2003A000219 itself filed 7 February 2003.

**FIELD OF THE INVENTION**

10        The present invention relates to a machine for producing [[a]] coffee beverage. More particularly this invention concerns an espresso machine.

**BACKGROUND OF THE INVENTION**

15        Traditional machines comprise a device to contain hold the ground coffee powder and the water supply device united in a single unit that also forms the ground coffee powder infusion chamber; moreover, said the machines also include a dosing device for the ground coffee powder, a moving action mechanism, a boiler, etc.

20        In said the known machines, the container - supply device is removable, for example, for cleaning or maintenance purposes [[;]]. In fact the container - supply device is the part that is most often soiled because it is always in contact

with the ground coffee powder and because the infusion operation occurs inside this device.

However, washing of this device is extremely difficult, and in certain cases, can also be ~~damaging for damage~~ the machine. In fact, it is very complicated to obtain access to the internal parts of the container - supply device, and this hinders [[the]] correct and complete cleaning operations, especially of the filter.

Moreover, since the container - supply device includes parts that ~~are in move~~ relative motion to one another, it is possible that the lubricant is removed, or that certain components are removed or displaced from their correct position during washing operations [[;]]. The consequences are easy to imagine, both in terms of possible machine damage and in terms of unsatisfactory coffee quality.

A further problem with traditional machines concerns the fact that the machine will produce good quality coffee only when the intervals between one coffee production operation and the next are very short. In the machines for the production of a coffee beverage (in particular domestic versions) that are used with average frequency, the time lapse between the preparation of one cup of coffee and the next is generally too long to guarantee that the internal machine parts, and in particular the water pipes, are still hot [[; and]]. Therefore the quality of the coffee produced by the machine is limited.

#### OBJECTS OF THE INVENTION

Therefore the technical task proposed by the present invention is to realize a machine to produce [[a]] coffee beverage that will eliminate the technical problems known in prior art.

5 Within the context of this technical task, one purpose object of the invention is to realize a machine that can be washed easily and without the risk of damaging the components.

10 Another purpose object of the invention is to realize a machine equipped with parts that are all easily accessible. In particular, the internal portions of the component adapted to contain the ground coffee powder, always particularly exposed to soiling risk even when separated from the machine, are easily accessible according to this finding: invention. This permits the maximum possibility of rapid complete cleaning operations, especially of the filter component.

15 A further purpose object of the invention is to realize a machine that can be washed without [[the]] accidental removal or displacement of consumer elements or parts such as the mechanism lubricant.

20 ~~The last but by no means the least purpose object of this invention is to realize a machine that produces coffee beverage that is sufficiently hot even when the machine is not in constant use with long intervals between one coffee production and the next.~~

The technical task, as well as these and other purpose objects, according to the present invention are attained with the realization of a machine for producing [[a]] coffee beverage according to the appended claims wherein the container can be removed from the machine, the container being connected to a moving mechanism adapted to displace the container from one position spaced from the supply device to a position attached to the supply device, the container having first and second connections to the moving mechanism, the first connection comprising at least one rotating pin and the second connection comprising hook-up couplings connected to a slide on the moving mechanism, mobile in relation to the pin, the slide exerting traction on the container to bring the latter in the position attached to the supply device.

15 BRIEF DESCRIPTION OF THE DRAWING

Further characteristics and advantages of this invention will be made clearer with the description of a preferred but not exclusive embodiment of the machine according to the finding invention, illustrated in an indicative but not limitative manner in the appended drawings wherein:

20 figure FIG. 1 shows a schematic view of the machine according to the invention;

figures FIGS. 2 and 3 show a cross-section of the container device in two different configurations positions;

25 figure FIG. 4 shows an exploded perspective view in perspective of the ground coffee powder container device;

figure FIG. 5 shows a lengthwise cross-section of a moving mechanism device according to this invention;

5 figure FIG. 6 shows a schematic cross-section of a portion of the machine in an idle configuration, wherein a rest position in which it is possible to extract the ground coffee powder container device;

10 figure FIG. 7 shows a schematic cross-section of a portion of the machine in a configuration position during the ground coffee powder supply action;

15 figure FIG. 8 shows a schematic cross-section of a portion of the machine during an operational stage;

15 figure FIG. 9 shows a schematic cross-section of a portion of the machine in a configuration position with the coffee container device connected to the fluid supply device so that it forms the infusion chamber;

20 figures FIGS. 10, 11, and 12 show a schematic cross-section of a portion of the machine in configurations positions wherein the ground coffee powder container is successively positioned further away from the fluid supply device;

25 figure FIG. 13 shows a schematic cross-section of a portion of the machine in a configuration position wherein the waste ground coffee powder is expelled from the container device;

25 figure FIG. 14 shows a schematic cross-section of a portion of the machine during a return stage in idle

configuration the position after the expulsion of the waste ground coffee powder;

figures FIGS. 15-18 show a schematic cross-section through are sectional views through a tap on the machine that 5 delivers liquid or steam in four different function configurations positions; and

figures FIGS. 19, 20, and 21 show a schematic section of a system for connecting the coffee container device to the machine. In particular, figure FIG. 19 illustrates the coffee 10 container device separate from the machine, while figure FIG. 20 illustrates the coffee container incorrectly or only partially connected to the machine so that the micro-switches will not enable the machine to produce the coffee beverage, and lastly figure FIG. 21 illustrates the position of the coffee container 15 device when it is connected to the machine correctly, so that the microswitch will transmit the consent to the machine to produce the coffee beverage.

#### SPECIFIC DESCRIPTION

In reference to the aforesaid figures drawing, the 20 coffee machine for producing a coffee beverage is indicated throughout with the reference numeral 1. The machine 1 It comprises a ground coffee powder container device 2 and a fluid supply device 3 for producing the coffee beverage, where both devices are reciprocally mobile so that when they are connected 25 together they form a coffee powder infusion chamber 4 (FIG. 10).

Advantageously, the container device 2 is removable from the machine 1 [[,]] so that it can be separated therefrom. In particular, as shown in the appended figures, the container device 2 is connected to a pivoting device pivot assembly 2a (FIG. 5) adapted to move the container device 2 from a position a certain distance spaced from the supply device 3 (FIGS. 6-8 and 11-14) to a position adherent attached to the supply device 3 (FIGS. 9 and 10).

The container device 2 presents has first and second means of connection connections 5 [[,]] and 6 [[,]] to the pivoting device pivot assembly 2a, where the first means of connection connection 5 (FIG. 5) comprises at least one rotation pivot pin 7 for container device 2 insertion, and the second means of connection connection 6 [[,]] (FIG. 4) comprises couplings 8 for connection to a slide 9 of the pivoting device pivot assembly 2a which is mobile in relation to the pin 7. The figure FIG. 5 shows that the slide 9 presents has seatings seats 10 for connection to the couplings 8. The rotation pivot pin 7 is preferably fixed and positioned lower than the slide 9.

The slide 9 is connected through a sliding action to can slide vertically along a guide 11 [[which]] that controls at least the angular motion of the container device 2 around on the pin 7 [[; in]]. In addition, the slide 9 is also connected through a sliding action to a driving action to a drive screw 12 that is rotated by an electric motor 13.

Basically the motor 13 controls the rotating action of can rotate the screw 12, and in cooperation with the guide 11, said the screw 12 prevents the slide 9 from rotating together with the screw 12, causing translation of the slide 9 along the screw 12 and rotation pivoting of the container device 2 around the pin 7 controlled by the profile shape of the guide 11.

As shown in the appended figures FIGS. 6 through 14, the container device 2 comprises at least three telescopic elements 15, 16, 18 that are connected to each other in sliding mode and relatively slidable. [[A]] The first telescopic element 15 is set on the rotation pivot pin 7, [[a]] the second telescopic element 16 is connected by sliding slidably on the first telescopic element 15, and [[a]] the third telescopic element 18 is connected by sliding slidably on the second telescopic element 16 and adapted to house at least one portion of the supply device 3 to form the infusion chamber 4.

Advantageously, the second telescopic element 16 presents has first abutments 19 (FIG. 8) adapted to act with second elastic abutments 20 of the first telescopic element 15, [[where]] such that, during the extension stage of the container device 2, the first and second abutments 19 [[,]] and 20, are adapted to control the translation action firstly sliding of the third telescopic element 18 in relation to the first and second telescopic elements 15, 16, and during the retraction stage of the container 2 device, they are adapted to control the translation, firstly sliding of the second and third telescopic

elements 16 [[,]] and 18 in relation to the first telescopic element 15, and then ~~the translation~~ sliding of the third telescopic element 18 in relation to the second telescopic element 16.

5 Moreover, the machine comprises a means of expulsion 22 (FIG. 4) for the waste ground coffee powder from the container device 2. The means of expulsion 22 is comprises, for example, an expeller lever connected to a double helix with pinion controlled rotation action. In this manner the expeller lever 22 10 is continually guided during ground coffee powder expulsion, limiting the danger of the powder granules blocking the mechanism and preventing correct machine function.

Advantageously, according to the present invention, the machine 1 comprises as shown in FIG. 1 an expansion chamber -, 15 identified by reference numeral 60, that presents has a flattened configuration having a basically truncated cone shape, interposed between a water tank 61 and the container 2 and supply device s-2 and 3.

The ground coffee powder container device 2 that can be 20 separated from machine 1, for example for washing purposes, presents has a blocking element adapted to maintain all the organs parts that compose the unit in correct position. As is shown in particular in figure FIG. 2, the blocking element comprises is a lever 51 hinged at [[point]] 50 to the first 25 telescopic element 16 [[;]]. The lever 51 presents has a

protruding portion 52 inside a tubular portion 53 adapted to house the pin 7.

The lever 51 presents has a right-angled end 54 that is inserted fits into [[the]] aligned holes 55 of the second and third telescopic elements 16 [[,]] and 18 to prevent said elements them from extending when the device container 2 is disconnected from the machine 1.

When device the container 2 is connected to the machine 1, the pin 7 rotates the lever 51 around the hinge 50 countering a spring action and causing the extraction of the end [[angle]] 54 [[from]] to pull out of the aligned holes 55, permitting the extension of the tubular elements 15, 16, and 18.

As shown in figures FIGS. 19, 20, and 21, mobile hooking teeth 101 can be foreseen for reciprocal approach and outward motion by means move toward each other against the force of a spring 102 [[,]] in order to connect the container device 2 to the machine 1. When the container device 2 is connected in the optimal manner to the machine 1, the teeth 101 are inserted correctly into [[the]] holes 105 permitting the correct closure of the hatch a cover 106, and consequently through a pin 107 [[to]] triggers a microswitch 108 that provides the consent to permits the machine 1 to produce [[the]] coffee beverage.

However after the elements have been disassembled, for example for washing purposes, if they are not re-assembled correctly by the user because the teeth 101 are partially, and/or incorrectly or not at all inserted in the holes 105, the

[[hatch]] cover 106 will not close correctly because of the enlargement angled faces 110 of the teeth 101 and the pin 107 will not trigger the microswitch 108, thus preventing all machine function.

5 Advantageously, the machine 1 according to this finding invention comprises a water or steam interception tap 25 (FIGS. 15-18) ; In particular tap 25 is adapted to intercept [[the]] water or steam that exits from the machine, and [[is]] positioned upstream of the container 2 and supply device s-2 and 3. It is  
10 especially practical that when the tap 25 is turned to one of its configurations positions, it is adapted to activate or deactivate one or more of the microswitches (not shown in the appended drawings for clarity) that control the switch-on or switch-off of [[the]] a water supply pump to [[the]] boiler 46 (FIGS. 7 - 9),  
15 and/or the switch-on or switch-off of [[the]] electric resistors/elements in the boiler 46.

The tap 25 presents has a body 26 having at least [[a]] first and [[a]] second communicating [[space]] passages 27 [[,]] and 28 , with opening to the exterior, and is equipped with a piston 29 connected internally in sliding mode. Together with the body 26, the piston 29 forms at least four chambers 30, 31, 32, 33, which can deliver water or steam alternatively.

20 [[Three]] The chambers 30, 31, and 32 are formed by grooves realized formed on the piston 29 and [[a]] the fourth chamber 33 has a variable volume and is formed between the 25 [[crown]] end wall of the hollow body 26 and the [[crown]] end of

the piston 29. Advantageously, [[a]] the first chamber 30 of the said four chambers is connected to a duct 30a that opens onto the crown at the end of the piston 29, a second chamber 31 is closed, a third chamber 32 is connected to a duct 32a that opens [[on]] 5 to the exterior [[of]] from the tap 25, and the fourth chamber 33 is connected to the [[space]] passage 28 of the water or steam supply on exit from the machine.

Moreover, in a preferred embodiment, the first [[space]] passage 27, (used for access to feeding water or steam 10 inside into the tap 25) is realized formed on a side portion of the body 26, and the second [[space]] passage 28 (used for water or steam discharge from tap 25) is realized on formed in the [[crown]] end wall of the hollow body 26.

The function of the machine for producing coffee 15 beverages according to this invention is obvious from the descriptions and illustrations, and in particular, is basically composed as follows.

The tap 25 is initially positioned in the configuration position shown in figure FIG. 15, with the chamber 31 that is 20 closed, in communication communicating with the fluid entry space passage 27 [[;]]. In this configuration position the pumps and the boiler resistors/elements are deactivated; no fluid can enter the interior of the tap 25, and therefore or exit from the machine 1.

Two examples are shown in figures FIGS. 16 and 17 to demonstrate how the boiler 46 (not shown) feeds the tap 25 with

steam. figure FIG. 16 shows the boiler pre-heating configuration where the space passage 27 communicates with the chamber 32 [[which]] that in turn communicates with [[a]] the duct 32a that opens outside the tap 25 [[;]]. The boiler supply pump is switched off while the boiler resistors/elements collaborate with a temperature sensor to control the temperature in the boiler 46 to produce steam. In this configuration position the forming of any possible pressure in the boiler 46 is prevented during the pre-heating stage because the steam is discharged into an expansion chamber 60.

However figure FIG. 17, represents shows the configuration where steam is used. In this configuration position, the space passage 27 communicates with the variable volume chamber 33 because the piston 29 is positioned at the maximum distance from the [[crown]] end wall of the hollow body housing 26. [[So]] The steam passes through the crosses-space passage 27 and enters the chamber 33 and is sent for use through the space passage 28. In this configuration position the boiler pump and resistors/elements are activated to send water into the boiler 46 (which is set at the temperature attained during the pre-heating stage), the water turns to steam, and the steam is supplied to the user.

figure FIG. 18 show the configuration in which tap 25 supplies [[the]] water to the machine 1. In this case the space passage 27 communicates with the chamber 30, which that in turn is connected to [[a]] the duct 30a that opens onto the crown at

the end face of the piston 29. Therefore the water crosses passes through the duct 30a and is sent for use through the space passage 28. In this configuration position the boiler pump and resistors/elements are activated to send [[the]] water into the 5 boiler 46 (which was brought under thermostat control in a transitory stage to the suitable temperature to produce hot water) [[;]]. The water is then sent to the user. When the tap supplies water to the fluid supply device 3, [[the]] coffee beverage can be produced.

10 figure FIG. 6 schematically shows the machine in [[idle]] the rest position. When the command is sent to produce [[a]] coffee beverage, the motion device 2a motor 13 of the pivot-assembly 2a activates the rotation of rotates the screw 12 [[,]] and aided by the nut screw, it causes the translation of 15 shifts the slide 9 along the [[same]] screw 12, and the rotation of pivots the container unit 2 around the pin 7.

20 figure FIG. 7 shows a stage in which the element 18 of the container device 2 is extended (to its maximum length because its abutments 36 are in contact with the corresponding abutments of element 16) to form a space to contain the ground coffee powder. A ground coffee powder dosing device , indicated schematically with reference numeral 35 , inserts feeds a pre-established quantity of ground coffee powder inside into this space.

25 At this point, because of the gradual extension, the elastic abutments 20 move past the abutments 19 of element 16 (as

shown in figure FIG. 8) and element 16 begins extension until a portion of the fluid container supply device 3 is inserted engages into the element 18 forming the infusion chamber 4 inside which the ground coffee powder is compressed (as shown in figure FIG. 9). In this position the element 18 presses by means of an abutment 38 on a lower portion 3a of the device 3 and triggers a microswitch 37 that arrests the motion and provides the command for water supply into the infusion chamber 4, aided by abutment 38.

As is shown in particular in figures FIGS. 8 and 9, before the container device 2 is connected to the supply container device 3 (and in particular to [[the]] its lower portion 3a), this portion 3a is in a position at a certain distance spaced from an upper portion 3b of the device 3.

When the container device 2 is connected to the supply device 3 it presses the lower portion 3a towards the upper portion 3b (as shown in figure FIG. 9) approaching pushing them together and activating the microswitch 37. Microswitch 37 that commands controls the water supply to the infusion chamber 4 and the production of the coffee beverage which is supplied to the user through a valve 40 positioned on the space on element 16.

Following this, the ground coffee powder container device 2 returns to idle configuration the rest position, first sending the element 16 back onto the element 15 and maintaining the element 18 extended (until the abutments 20 are aligned with but not past the abutments 19, but have not yet passed them)

[[;]] . The element 18 returns onto element 16, bringing its abutments 41 onto the corresponding abutments of the element 16, and in this manner causing the elastic abutments 20 to pass over the abutments 19 and to move further on (figure FIG. 12).

5 At this point, as shown in figure FIG. 13, the expulsion [[means]] lever 22, ~~for example composed of an expelling lever, expel~~ expels the waste ground coffee powder in the form of a single compressed tablet. The ground coffee powder tablets are collected in a practical manner in a waste container  
10 42.

Last of all, the ground coffee powder container 2 device is then partially extended, returning to [[idle]] its rest position with the abutments 20 opposite but above the abutments 19 (as shown in figure FIG. 14).

15 In a particularly advantageous embodiment, the machine 1 comprises safety means adapted to interrupt machine function in the case of any faulty conditions, especially in the connection between the third tubular element 18 and the lower portion 3a of the fluid supply device 3. In particular, the safety means comprise a position detector (not shown) adapted to detect the 20 position of the third telescopic element 18 connected to an electronic control processor.

In the case of faulty machine function due to incorrect alignment between element 18 and portion 3a of device 3, for 25 example, or the presence of ground coffee powder in the mechanical parts, or similar conditions, the electronic processor

prevents the triggering of the microswitch 37 that commands the water supply to the infusion chamber until the element 18 has been replaced set in its correct position.

With this system, the microswitch 37 cannot be triggered until the connection between element 18 and portion 3a of the device 3 is not performed correctly [[()]] with element 18 at least in a predetermined position of a certain quota and device 3 that can activate the microswitch 37. [()]

Moreover, after a certain time lapse following the connection between element 18 and portion 3a, the electronic processor will cut off the action of motion mechanism 2a.

In this way, if the microswitch or some other component is damaged, this system will prevent any further damage to the machine 1.

In addition, advantageously, acting together with the electronic processor, the detector is adapted to command the arrest of stop the element 18 in a pre-established position in relation to the dosing device 35.

When it is necessary to remove the ground coffee powder container device 2 from machine 1, first the hook-up couplings 8 must be released from their seats on the slide, and element 18 must be slid off pin 7.

This way, the ground coffee powder container device can be washed very easily because it does not involve moving the whole machine, and all parts are easily accessible, above all the filter.

The present invention also relates to a machine for producing a coffee beverage wherein the fluid supply device 3 is connected to the boiler 46 so that the heat dispersed by the boiler 46 heats the fluid supply device 3.

In particular, in the example shown in the drawing the appended figures, boiler 46 is located above the supply device 36. Moreover, above the boiler 46, the machine 1 is provided with a metal plate (preferably aluminum) adapted to absorb the dispersed heat from the boiler 46 so that it remains hot and acts as a support for keeping cups warm.

The present finding invention also relates to a heating method for a machine that produces coffee beverages. The method consists of heating at least the supply device 3 with the heat dispersed from the boiler 46 of machine 1. It is particularly practical that the boiler 46 and the supply device 3 are in contact with each other since the heat is transmitted by means of conduction in a manner to guarantee correct heating of supply device 3. Moreover, at least one portion of the container device 2 is automatically connected to the supply device 3 while the machine 1 is idle, so that the container device 2 is also heated by the boiler 46. Another practical aspect is the fact that the container device 2 is automatically connected to the supply device 3 after a pre-established time lapse following the preparation of the last previous coffee beverage.

It has been demonstrated how the machine for producing coffee beverages according to the present invention results as

particularly advantageous in that it can be washed very easily without risk of damage to the machine and without the need to handle heavy and cumbersome components.

The machine for producing coffee beverages conceived in  
5 this manner may be subject to numerous modifications and variants, all of which remain within the context of the present invention; moreover, all components can be replaced with elements that are technically equivalent.